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ABSTRACT

This study examined the effectiveness of an educational computing course on preservice teachers' computer use and attitudes toward computers in education. The study used data from 16 (12 female, 4 male) preservice teachers who attended the University of Southern California. Results indicated that teachers' prior computer experience shapes their expectations from the course. Teachers reported that having a home computer, professor's willingness to teach, and the current utilization of technology in the schools at which they work also influenced their attitudes toward computers and their computer use. Based on the findings, several recommendations are offered for practitioners and teacher education institutions. (Author/AEF)

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Are Educational Computing Courses Effective? Teachers are Talking

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Abstract: This study examined the effectiveness of an educational computing course on preservice teachers' computer use and attitudes toward computers in education. The study used data from 16 (12 female, 4 male) preservice teachers who attended the University of Southern California. Results indicated that teachers' prior computer experience shapes their expectations from the course. Teachers reported that having a home computer, professor's willingness to teach, and the current utilization of technology in the schools at which they work also had influence on their attitudes toward computers and their computer use.

Introduction

It is obvious that information and its technologies will dominate the 21st century. Computer technologies are playing important and essential roles in education because of their tremendous potential for teaching and learning. Therefore, it is critical for individuals to have the necessary education and skills to compete in the next information dominated century. Similarly, teachers also should be capable of conveying computer skills to students in the classroom.

In most teacher education institutions, computer specific courses are offered as an initial attempt to prepare a student teacher's future in computer technologies. In fact, most states require pre-service and in-service teachers to take a computer literacy course while fulfilling the requirements for a teaching credential. These courses are usually designed to teach basic computer skills and to introduce teachers to several commonly used computer applications such as word processing, spreadsheet, databases, telecommunications, presentation programs, and integration of these applications into the classroom. These courses are intended to provide pre-service and in-service teachers with more hands-on experiences so that they can integrate computer technologies into their teaching practices.

A large body of literature supports the idea that the biggest obstacle to teachers using technology in their classrooms is the lack of adequate teacher training (Brooks & Kopp, 1990; Ingram, 1992; Beaver, 1992; Vagle & College, 1995). Perkins (1992), for example, pointed out that teachers are not being adequately prepared for the challenges of the next century: ". . . students are learning and teachers are teaching in much the same way they did twenty or even fifty years ago. In the age of CDs and VCRs, communication satellites and laptop computers, education remains by and large a traditional craft." (p. 3). Moursund (1989) is even more expressive in his criticism: ". . .our colleges of education are doing a miserable job of preparing teachers to deal with the Information Age" (p. 9).

Needless to say, Perkins's and Moursund's standpoint in the issue of Information Technology and Teacher Education is one of the most detracting ones. However, there is a large body of literature that supports their point of view. In a report, Office of Technology Assessment (1995) predicted that American schools have 5.8 million computers in use for instruction. However, the number of teachers who report little or no use of computers for instruction is still considerable. In the same report, it is also demonstrated that teachers use technology for instruction in much more traditional ways rather than using computers as a tool to improve students' critical thinking and problem solving skills.

Despite the current attempts at preparing student teachers to use computer technologies, a large body of research indicates that "teachers are more hesitant and less likely to embrace computer technology than other professionals" (Paprzcki & Vidakovic, 1994: p. 74). According to Wetzel (1993) education majors who become teachers report that they hesitate to use technology and do not feel prepared to integrate technology into their instruction when they are employed in schools. This raises questions about the effectiveness of pre-service teachers' technology training.

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Data Collection and Analysis

A questionnaire was prepared and distributed to those who volunteered to participate. In addition, semi-structured interviews were scheduled for participants to explore their feelings in depth about the effectiveness of the course. 20 (16 females, 4 males) students agreed to participate in the study. The questionnaire and interviews focused on the following areas:

1- *Expectations:* Students' expectations from the course, and effectiveness of the course in terms of satisfying their expectations.
2- *Attitudes and Computer Use:* Effectiveness of the course in terms of helping students develop positive attitudes toward computers.
3- *Other Factors:* Other factors that students believe contributed to the changes in their attitudes toward computers and increased their computer use.
4- *Professional Development:* Effectiveness of the course in terms of students' professional development.

In data analysis, qualitative methods were used. The original responses of the participants were put together and organized. Responses were coded under the areas listed above. Finally, conclusions were drawn in order to move from particulars to a more general class of conclusions.

Findings

Expectations:

The first question focused on the expectations of students from the course and the effectiveness of the course in terms of satisfying students' expectations.

Responses of participants clearly indicated that students had various expectations even though all expected to learn more about computers in education. For example, most of the students indicated the main reason for taking the class was to learn how to utilize the computer and software for teaching students in the classroom.

There were five participants who specifically outlined their expectations from the course. It was evident from their responses that they already had some previous computer experience. One of these students wrote that he had enrolled in every computer science class since 1991. Due to their previous exposure to computers, they were able to recapitulate their expectations. For instance, one of those stated that:

> I was expecting to learn how to make the most effective and efficient use of the available instructional technology in order to enhance the teacher-learner interaction. I also expected to learn the new classroom applications of the computers like WWW and Java language, so as to maintain my knowledge and skills up to date, given the fact that instructional technology is rapidly changing field. Finally as an educator, I would like to learn how to improve students' computer literacy in order for them to meet the demands of society and of the job market, which require an always higher computer literacy level.

When the same student was asked to evaluate the effectiveness of the course in terms of meeting his expectations, he stated that "This course did not satisfied my needs and expectations as much as I had hoped." He believed that he already had basic computer skills and he wanted to enhance his previous computer skills with new advance applications:

> This course did refresh my memory about certain software that I had previously been exposed to and this was fine. But, I was expecting to explore new applications and programming like JAVA and HTML and how to develop learning materials by using these programs. I guess this course was a great opportunity for those who had no prior knowledge of computers.

On the other side of the spectrum, the remaining students did not elaborate their expectations and basically indicated that they expected to learn how to utilize the computer in the classroom. Fulfilling the requirements for teaching credential was also a concern of one of the students. Unlike experienced students, one student stated that "I expected to develop increased confidence and enthusiasm about the computer. I thought this course was to teach us programming. I am happy that it was not." The following statement of a student is the best representative of how these students described their expectations from the course.

> When I enrolled in the course, I was expecting to be introduced to basic computer skills and software that I could use for myself and for the classroom. I also expected to learn more computer terminology so I may understand items using computer terms.

When the same students were asked to evaluate the effectiveness of the course in relation to meeting their needs, they all stated that the course was satisfactory and was of a high value to them. They thought that the course was useful to them not only as an educator, but also as a student because they learned how to access on-line sources for their class assignments. The following statement summarizes these students' perceptions of the effectiveness of the course in meeting their needs and expectations:

> The course was helpful because it introduced materials that I did not know before. The most useful parts were the spreadsheets and database because those were the two applications I felt most reluctant about using. The course has really supplied me with very valuable information. WWW search for lesson plans is one that I know I can use.

Students' responses to the first question clearly indicated that prior computer experience and knowledge shape their expectations. Students with previous experience enroll in computer literacy courses expecting that they would be able to enhance their current computer skills and explore advance computer applications and even programming languages. On the other hand, students with little or no prior computer knowledge expect computer literacy courses to introduce them the basic computer skills and applications. They also believe that the course should help them increase confidence about the computers.

Attitudes and Computer Use:

The second question was posed to determine how the course contributed to the changes in teachers' attitudes and computer use. Not surprisingly, all of the respondents reported that the course had positive effects on their attitudes even though some students reported much greater gains from the course than others. There were three students who stated that they had always had positive attitudes toward computers. Therefore, they believed that the information they learned from the course was supplemental. One of the students commented:

> Since I already had positive views about computers in education, this course merely supported those views. It did clarify some issues I did not understand. This course also opened up my eyes, a bit more, about the power of computers in education. Its effect on my attitudes towards computers has been positive because it has shown me how easier things can be using a computer.

On the other hand, the remaining students wrote that the course helped them to feel more positive and confident with computers. One student commented that,

> This course made me realize how important it is for the teachers to take a course like this and be exposed to computers because it plays a critical role in education today and or the future. I have also learned not only it is essential to understand the basics of computers, but it's also helpful in the classroom.

Another student reported that she was not comfortable with some of the new programs, but this course changed her fears to confidence in using them. Similarly, one student further elaborated on the reasons why he thought the course changed his attitude towards computers:

> This course changed my attitude toward educational uses of computers by teaching me how computers can make instruction more meaningful for K-12 students and how they can bring students to make connections across content areas. For instance, a hyper-media environment on a real life problem, such as building a bridge near the school, can bring pieces of the real world into the classroom and bring them under students' control. The course also changed my attitude toward computers by broadening my background on the possibilities they offer, and on the content available through software and the Internet.

When the students were asked to describe the affects of the course on their attitudes, they tended to express them in general terms. However, nearly all of them mentioned the following topics. They believed the course helped them develop positive attitudes by:

a. making them more at ease with using applications,
b. helping them gain more confidence,

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c. increasing their awareness of computers and its applications, and
d. demonstrating how computers can be integrated into the curriculum.

In summary, responses to the second question revealed that all students believed the course itself contributed to the changes in their attitudes toward computers even though a few students manifested that this contribution was supplemental since they always had positive views for computers in education. It was very important to students that the course helped them gain more confidence and demonstrated them how computers could be integrated to the classroom teaching.

Other Factors:

The third question was asked to determine if there were other factors that students believe contributed to the changes in their attitudes and their computer use besides the course they completed. Responses to this question varied considerably. For example, one student reported that her home computer influenced her attitude, because she wanted to learn how to use it. She stated she wanted to get the most out of the class for what she paid. Another student believed it was the professor's willingness to teach them about computers.

Analyses of responses indicated that most respondents believed the demands they are facing from the schools at which they work is an important factor that helped them increase their willingness to learn about computers. For example, one student commented:

> Because I am a teacher, it is almost essential for me to be somewhat computer literate. The children in my class go to the computer lab often and so I have to be able to help them. This has made me want to learn more about using computers.

She further stated:

> The most important factor that has helped me feel comfortable with computers, however, is that I own one. The computer has proved to be extremely helpful for me when I am doing my schoolwork, my personal business and my work activities.

On the other hand, one student stated that it was not the computer utilization that encouraged her to learn about computers, but the lack of computer utilization that she had witnessed in the school at which she works. In addition, she commented, "I believe every child should be able to use them [computers] and it is our [teachers'] responsibility to teach them about computers."

There were three students who related their willingness to learn more about computers for more personal reasons. For example, one of them said, "I have two elementary school-age nephews, and I want them to learn computers to be successful in education as well as professionally." She further stated that her concern also extends to the students she is teaching. Another student thought that computers are beneficial for her own education and that makes her have positive feelings about computers. She wrote that, "the fact that computers have been an invaluable asset to me in my own education has greatly affected my attitude towards computers." Finally, the third student wrote, "I use a computer at work everyday, and it helps me handle my job more efficiently. I also extended my computer skills to communicate with my professors and co-workers and I love playing with the Internet."

In summary, it is clear that the most important factor for teachers that they believe affected their computer attitudes besides the course was seeing their students already using them in the class. They felt that as a teacher they also have to be computer literate and help their students with their endeavours. Analyses of the responses to the third sub-question also indicated that the possession of a home computer increases teachers' access to computers and as well as their willingness to learn more about them. Finally, given the fact that pre-service teachers are also students working on their teaching credential, they felt computers were providing a great asset to them in their own education and thus, it helped them develop positive attitudes toward computers.

Professional Development:

The last question sought to discover whether student teachers believed the course contributed to their professional development. There is a sizeable body of research suggesting that students value a course more if they believe the course contributes to their professional development. Research also indicates that when students value the course they are more likely to have positive attitudes toward it. That is why the question for the last theme was asked to participants to find out if they valued the computer literacy course in regard to their professional development.

Analyses of responses to the question indicated that students valued the course according to their previous computer experience. Those who had prior computer experience reported that the course did not

contribute a great deal to their professional development, while non-experienced students thought that the course definitely contributed significantly to their professional development.

On one side of the spectrum, experienced students indicated that the course could have contributed to their professional development if the content was determined in an accord to their needs. For example, one student commented:

> I would recommend this course to those who are not at all familiar with computers. However, for experienced users, I didn't find it challenging enough. It was a lot of busy work as far as the homework was concerned. This course did add computer terminology that I was not very familiar with, but most items were not new to me. Also, I did obtain a few practical ideas about using computers in the classroom, but again, I would have wanted more.

Another experienced student agreed with the previous student's feelings about the course. He further suggested:

> I would rate the course above average because I felt it took a bit long on the basics like the hardware and monitor. A more effective way would be to divide the class into those with no experience/those with some/and expert. Once we got into working on different programs this course did help my professional development.

One student underlined the importance of a follow-up course for teachers' professional development. She wrote that, "it needs to be more in depth. This course breezed over a lot of information because of the time frame, but for our professional development, a follow-up course is needed so teachers are more competent with computers."

On the other side of the spectrum, students with no or little prior experience with computers indicated that the course was of a great contribution to their professional development. One of these students wrote:

> This course has been one of the most valuable classes I have taken. It has opened many new avenues for me to explore. Now that I have gained a better understanding of the programs available to me, I can better teach my students and prepare them for the 21st century. Each child must become computer literate in order to succeed in our highly competitive world. As their teacher, I am responsible for their success.

Another student also thought that the course definitely contributed to her professional development. Similar to experienced students, she further indicated that she was in favor of having more computer courses. She commented that, "I did value this course and wished there were more courses just like it or similar offered because I would surely enroll and enjoy them very much. This course helped me to feel more advanced/educated in my field." Another student gave a concrete example in order to describe the effects of the course on her professional development while she believed that the course was only a beginning for her. She wrote:

> I am satisfied this course has contributed much to my professional development. Surely, I still need to learn much more knowledge and skills to consider myself truly computer literate, yet this course has sent me on the road toward becoming computer literate. I am definitely a lot better than when I first began.

It was obvious from the responses that the more new skills students gained from the class, the more they valued the class and the more the class contributed to their professional development. Interestingly, regardless of their previous experience with computers, the students believed that a follow-up computer course would significantly contribute to their professional development. Finally, all respondents agreed that the course was very useful to those who had no prior computer experience.

Conclusions and Recommendations

Based on the findings, the following recommendations are offered for practitioners and teacher education institutions:

1. Unquestionably, the best way to encourage teachers to use computers in the classroom is to increase their level of competency. This can best be achieved by providing several computer literacy courses that are designed according to the individual's level of confidence, anxiety, and competency.

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2. If more advanced computer literacy courses are not available for those who are highly competent users and request specific training on high-end software, those individuals should be assigned to more challenging assignments based on their competency levels and expectations. On the other hand, teachers with no or little prior experience should be provided with more personal attention to explore the basics of computers.
3. Even though every student teacher is mandated to take at least one educational computing course, the value of this course is limited unless computers are integrated into the entire teacher education curriculum. Therefore, teacher education institutions should take the initiative to employ new policies to incorporate technology into their curricula outside of computer literacy or instructional technology courses.
4. Faculty of teacher education programs should demonstrate their competency and willingness to use technology in teaching. They should be role models for prospective teachers in integrating technology into the classroom teaching.
5. Teacher education programs should provide technology training for prospective teachers which can satisfy their specific needs in the schools at which they work. Therefore, teacher education institutions and schools districts should cooperate in designing technology-training curricula to meet teachers' specific technology needs.

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